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A Study in the epidemiology of Tuberculosis in the province of Tartous- Syria for the period 2012-2016

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ABSTRACT

This study aims to identify the epidemiological profile of tuberculosis in Tartous governorate, due to the increase in the number of infections in the governorate during the period (2012-2016). The recorded data on TB cases at the Department of Communicable Diseases were adopted for the study using statistical analysis to assess the situation of tuberculosis, taking into account the different variables (age – gender - type of tuberculosis - places of infection in the center of the province and its country sides - treatment protocols).

The study included 741 cases, more than half of the cases (411 cases, 55.5%) were pulmonary tuberculosis, both open and closed. The results showed an increase in the incidence of tuberculosis due to the absence of awareness campaigns and the migration of the population during the crisis to the province of Tartous, the decline in the level of income and low immunization level as a result of increasing cases of malnutrition. Thus, further studies are recommended in order to detect the spread of lymphatic, bronchial and polypathy.

KE YWORDS: Tuberculosis, prevalence, Tartous province.

1. INTRODUCTION

Mycobacterium tuberculosis is the causative agent of tuberculosis, which often affects the lungs, lymph nodes, bones, meninges, urinary tract and urinary system (the most common form of non-pulmonary tuberculosis is urinary tuberculosis), reproductive system and many other organs, as a primary or subsequent injury to pneumonia. Tuberculosis is treatable and can be prevented.

Tuberculosis is one of the top 10 causes of death worldwide. It is important to mention that open pulmonary tuberculosis spreads from person to person through the air. A person with low immunity needs to get a few of these germs to become infected with tuberculosis. Recently, about a quarter of the world's population has been found to have underlying tuberculosis, meaning people have been infected with TB but have not yet developed the disease.

It is very important to take the samples properly before starting treatment with the need to confirm the diagnosis because the treatment of tuberculosis is long with adverse side effects of antibiotics for the length of treatment required for recovery. Samples should be transferred to the laboratory immediately in sterile-sealed containers to avoid possible bacterial overgrowth (many samples contain normal flora). Samples should be refrigerated, or kept in a cooler, if the transfer to the laboratory takes longer than one hour.

In case of TB outside the pulmonary, a biopsy is required for diagnosis. Here, too, care should be exercised carefully; as the biopsies should be placed in sealed containers and delivered to the laboratory in dry containers or to add 5 mL saline solution and never be put in formalin because the latter will kill the living organisms.

The Mantoux test - also referred to as the tuberculosis test - is an important diagnostic test for active TB, especially in children. However, the negative test of Mantoux does not rule out the disease clinically. It was found that about 20-30% of patients with active TB may show negative results when tested by Mantoux, knowing that it is not common to perform specialized tests (including DNA amplification testing techniques, such as polymerase chain reaction (PCR).

These tests can be used for quick identification if the patient's sample contains mycobacterium tuberculosis. It is necessary to consider the emergence of false negative cases based on the quality of the sample provided, and on the number of tuberculosis mellitus in the sample.

10.4 million people were infected with tuberculosis in 2016 worldwide, and 1.7 million people died of the disease. According to the World Health Organization (WHO), about 95 percent of TB deaths were found in low-and middle-income countries.

The continued crisis in Syria and the decline in the supply of therapeutic drugs to tuberculosis in some provinces and the withdrawal of some health centers from the service adversely affected the efforts to diagnose tuberculosis and treatment and prevention, where Syria before the crisis achieved high health gains in the prevention of tuberculosis with a low prevalence of tuberculosis of about 85 Per 100,000 people in 1990 to 23/000 100 in 2011. But during the crisis, prevention of tuberculosis, diagnosis and treatment of MDR-TB declined. It is important to mention the methods of diagnosing the disease in Tartous province, which includes:

- Diagnosis of tuberculosis in adults where this is done if the patient's cough usually lasts for 3 weeks or more, and is associated with sunburn in addition to one of the following symptoms: general fatigue - night sweats - fever - lack of appetite.
- Diagnosis of pulmonary TB, depends on the diagnostic evidence adopted by the National Committee for TB Control in the Syrian Arab Republic, which includes the examination of:

Throat and pharynx: Upper respiratory tracts are often complications of pulmonary disease.
Esophageal tuberculosis: examination of cerebrospinal fluid (chemical - biological - bacterial).
Bone tuberculosis: clinical symptoms + radiograph + biopsy when available
Renal tuberculosis: clinical symptoms + sterile parenchyma + examination of bacillus three times in a row and then in urine after 24 hours + dermal imaging of urethra + transplant bacillus bovine
Diagnosis of tuberculosis in children: The positive Tuberculosis with cough is rare in children, and most children are unable to do so. This does not mean neglecting their treatment. The most important points to be considered are:

- Having a family story in contact with an elderly patient who has a positive lung.
- abnormal radiological manifestations that show a unilateral largeness in the lungs or spasms in one of the lungs
- Positive tuberculosis test greater than 10 mm in a child who is not vaccinated or overturned tuberculosis test for positive after a control period or positive tuberculosis test greater than 15 mm in a vaccinated child.
- Clinical signs of tuberculosis, coughing for 2-3 weeks without improvement treated by antibiotics.
- Results of examination of the detachments of the stomach.

Therapeutic program of the Ministry of Health in the Syrian Arab Republic:
First therapeutic program CAT 1 Target group: Cases of Pulmonary and extra Pulmonary; Duration of treatment 6 Months Excluding Tuberculosis Meningococcal, the treatment lasts for 9 Months which includes:

- Intensive Quadratic treatment for two months: (isoniazid- ethambutol - streptomycin - pyrazinamide)
- continuous binary treatment for 4 months bivalent (isoniazid-rifampicin)

Second therapeutic program CAT 2 Target group: Previously targeted cases (treatment failure on CAT 1 and relapses and postoperative treatment) Duration of treatment is 8 months

- Two month. 5-drugs treatment (isoniazid- ethambutol - streptomycin - pyrazinamide - rifampicin)
- Quadratic treatment for one month (isoniazid-ethambutol - streptomycin - pyrazinamide)
- tripartite treatment for three months (isoniazid-rifampicin -ethambutol)

Third therapeutic program CAT 3 - Target group: It is a prevention program. It provides protection from infection to people who come in contact with patients, as well as those who are at risk of being infected. The program consists of a single treatment (isoniazid) for 6 months.

2. MATERIALS AND METHODS

The Area of Study: Tartous province forms the southern part of the western waterfront of Syria. With a 90 km long beach. It has an area of about 80 square kilometers and has a population of about one million according to the census of 2013. Its climate is warm and moderate, the rain is very variable in many parts of the winter, spring and autumn and the rainfall rates to 1000 mm. This area is characterized by dense forests and mountainous areas. The community is divided into a rural nature (the largest part) and an urban area represented by the city of Tartous, which is the capital of Tartous province.

Figure.1. The location of the province of Tartous

The Design of the Study: The study adopted the data recorded for TB cases from the Department of Communicable Diseases in Tartous Governorate for the period 2012 - 2016.

- Information was recorded in tables and charts for comparison including age, gender, incidence, and protocols used in treatment.
- Results were analyze using the Chi-square test.

3. RESULTS AND DISCUSSION

Relationship between the number of cases and the gender of the infected: We studied the statistical relationship between the number of cases and the gender, and we found a relationship between gender and infection. But these differences are according to sociocultural components such as income, awareness. And behavioral components like smoking, alcohol etc. not due to sex hormones differences.

Table.1. Number and percentage of infections by gender in Tartous region and rural areas (2012-2016)

Year	Number of infections in males	Number of infections in females	Total number of infections
2012	76 (59%)	54 (41%)	130
2013	107 (72%)	43 (28%)	150
2014	114 (64%)	66 (36%)	180
2015	89 (66%)	46 (34%)	135
2016	95 (66%)	50 (34%)	145

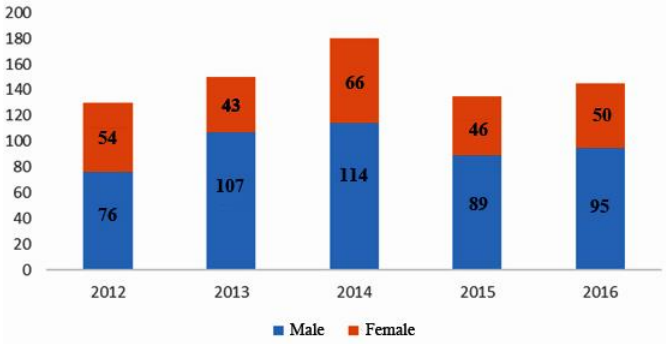

Figure.2. Classification of Infections by gender

Relationship between the number and percentage of TB cases in Tartous province and its country sides: Table.2 and Figure.3, show the number and percentages of TB cases in the center of the province, and in rural areas for the period 2012-2016.

Statistical significance: The value of the Kay box test is 5.9. This indicates a statistically significant relationship between the demographic distribution (within the center of the province) and the prevalence of the population. This implies a correlation between the variables and the 95% confidence level.

Table.2. Shows the number and percentage of TB cases in Tartous province and its country sides during the period 2012-2016

Number of infections outside the province center	Number of infections in the center of the province	Total number of infections
511 (69%)	230 (31)	741

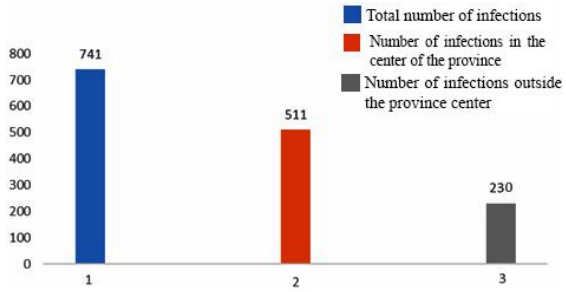

Figure.3. Classification of infections by the center of the province and country sides

Relationship between the numbers of infections by year: Table.3 and Figure.4, show the number of infections by year for the period 2012 - 2016. Here, we find that the infections started to increase gradually during 2012 and 2013, and this accompanied with the start of the influx of citizens to Tartous province due to the crisis from several provinces until 2014 where The number of infections reached a peak in line with the increase in the number of arrivals to the province, but in 2015-2016 the number of infections began to decline and reached similar numbers recorded before the crisis.

Table.3. Number of infections by year

2011	2012	2013	2014	2015	2016
115	130	150	180	135	145

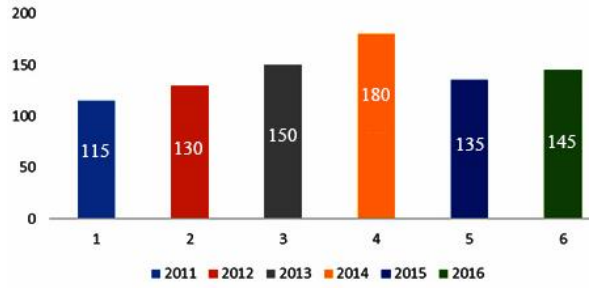

Figure.4. Shows the number of infections by year

Relationship between the Tuberculosis infections and Place of infections: Table.4 and Figure.5, show the distribution of cases according to the incidence of tuberculosis, where we found that more than half of the cases recorded were open and closed pulmonary tuberculosis.

Statistical significance: The value of the Chi-square test is 2.6, indicating that there is a statistically significant relationship between infection and TB; Correlation between variables at 85% confidence level.

Table.4. Distribution of cases according to the incidence of tuberculosis

TB infections by location of infection	Number of infections
Open pulmonary tuberculosis	251 (31%)
Closed pulmonary tuberculosis	160 (21.5%)
Lymphatic tuberculosis	150 (20%)
Thrombocytopenia	138 (18.4%)
Esophageal tuberculosis	18 (2.3%)
Renal tuberculosis	16 (2%)
Bone tuberculosis	14 (1.8%)

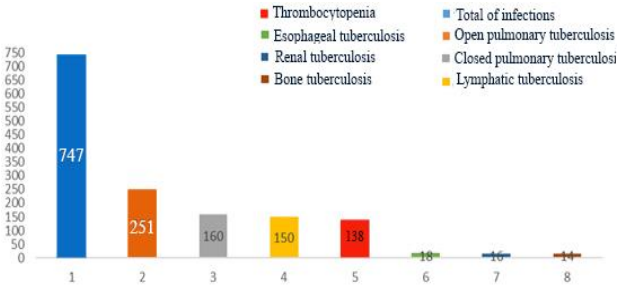

Figure.5. Classification of Tuberculosis infections by Place of infections

Protocols used for treatment: Table (5) and Figure (6) show the protocols used for treatment according to the Department of Communicable Diseases in Tartous Province.

Table.5. Shows the protocols used in the treatment

Protocols used to treat TB infections	Number of cases
CAT1	560
CAT2	115
CAT3	68

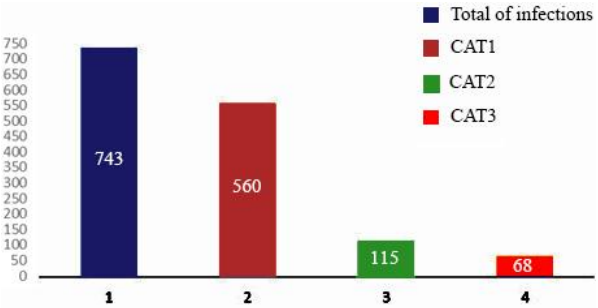

Figure.6. The protocols used in the treatment

Relationship between number of cases and age: Table.6 and Figure.7, shows Number and Percentage of Tuberculosis in Tartous Region and Rural Areas by Age during the Period 2012-2016

Table.6. Classification of Tuberculosis Infections by Age Groups

Age Group	Number of Cases	Age Group	Number of Cases
Less than a year	75 (10.1%)	41-45 years	43 (5.8%)
1-5 years	35 (4.3%)	46-50 years	50 (6.3%)
6-10 years	17 (2.2%)	51-55 years	52 (7%)
11-15 years	15 (2%)	56-60 years	34 (4.6%)
16-20 years	55 (6.5%)	61-65 years	31 (4.2%)
21-25 years	83 (11.2%)	66-70 years	14 (1.9%)
26-30 years	80 (10.8%)	71-75 years	16 (2.2%)
31-35 years	77 (10.4%)	Above 75 years	23 (2.8%)
36-40 years	57 (7.7%)		

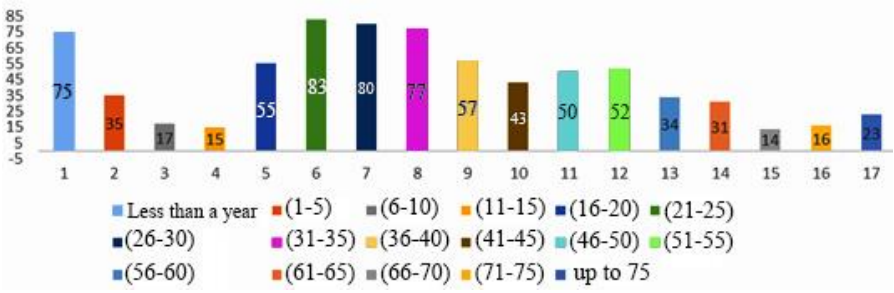

Figure.7. Shows tuberculosis infections by age group

As noted in the statistical records, 51 (68%) of the 75 cases in children under one year had the lymphatic tuberculosis following vaccination, and 50% of the cases of lymphatic disease were present in children under the age of 5. and there was an increasing in tuberculosis infections by age between (21-35) years. Our interpretation is based on the possibility an error may have occurred in the way of giving the vaccine and a weak response, especially cellular immunity, which plays an important role in the prevention of tuberculosis.

Table.7 and Figure.8, shows the distribution of lymphatic disease by age.

Table.7. Classification of lymphatic infections only by age group

Age group	Number and % of infections	Age group	Number and % of infections
Less than a year	51 (34%)	26-35 years	17 (11.33%)
1-5 years	24 (16%)	36-45 years	7 (4.7%)
6-15 years	9 (6%)	Above 45 years	21 (14%)
16-25 years	21 (14%)		

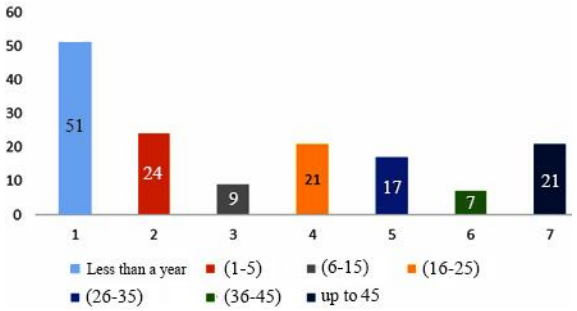

Figure.8. Classification of infections (lymphatic tuberculosis) by age group

4. CONCLUSIONS

Based on our study, we found that there is an increase in the incidence of pulmonary tuberculosis in both open and closed types, particularly in 2014, due to the increase in the number of arrivals to the center of the province and its various regions this year, and the lack of awareness campaigns which we attribute to the crisis in the country, which affected preventive health care in the affected areas in particular. This is not due to the inefficiency of programs in the prevention of health carried out by the members of the Ministry of Health, on the contrary, the Directorate of Health in the province and the efforts in the rest of the province have made extraordinary progress and in preventing the health situation from collapsing despite the overwhelming circumstances and the challenges they faced.

Our results coincide with the sudden increase in TB cases in Lebanon over the past years due to the increasing number of Syrian refugees in Lebanon and their widespread distribution and exposure to the most severe environmental, social, food and health problems in the overcrowded communities, with the absence of primary and preventive health care in particular.

We found a significant statistical relationship between the numbers and percentages of infection in the center of the province and in rural areas. There is also a statistical indication of the types of tuberculosis in the center of the province and its countryside. We did not note the statistical significance between tuberculosis and some variables such as gender. We found that the highest rate of lymphatic disease was among children under one year of age, which accounted for 68% of the total number of infections among this age group and after taking the BCG vaccine, and 50% of the injury rate among children under 5 years was a lymphoma.

This study also showed that tuberculosis affects mainly the productive group in society and thus impedes the economic development of both the individual and society (Table.6). This corresponds to the study of Gajbhare (2015).

Recommendations:

- Activation of many epidemiological studies in preparation for an integrated epidemiological map throughout Syria.
- Implementing TB prevention measures through awareness campaigns in all media
- The establishment of mobile medical teams in rural areas and in densely populated neighborhoods to investigate the incidence of tuberculosis
- The patient's full commitment to the drug treatment specified with the application of the principle of follow-up treatment by the health units
- In different areas with periodic examinations every 3 months to follow the development of the condition of the patient during the treatment period and after a period of two years.
- Taking radiographs and performing laboratory tests for all suspected cases is a minor injury
- The absolute commitment of preventive vaccination programs, especially children, with additional vaccination campaigns in cooperation with the World Health Organization
- Application of pre-screening programs for expatriates to ensure that they are free from tuberculosis.
- Adopting the school feeding program for primary school students in cooperation with the UNICEF organization, particularly in schools in the city centers and the elementary schools in rural areas.

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REFERENCES

Andrew J. Codlin, Short Report: Gender Differences in Tuberculosis Notification in Pakistan, The American Society of tropical medicine and hygiene, 85 (3), 2011, 514–517.

Dnyaneshwar M. Gajbhare, Rahul C. Bedre, Harsha M. Solanki, An Epidemiological Study of Tuberculosis Patient with Special Reference to Cost Incurred by Patient for the Treatment in an Urban Slum of Mumbai, Maharashtra, International J. of Healthcare and Biomedical Research, 03 (02), 2015, 50-59.

Farai Nyabadza, Dieter Winkler, A simulation age-specific tuberculosis model for the Cape Town metropole, South African Journal of Science, 109, 2013.

Henry DN Nyamogoba, Grace Mbuthia, Gender-age distribution of tuberculosis among suspected tuberculosis cases in western Kenya, Medicine Science International Medical Journal, 06, 2017, 8735.

Lin CY, Chen TC, Lu PL, Lai CC, Yang YH, Lin WR, Huang PM, Chen YH, Effects of Gender and Age on Development of Concurrent Extra pulmonary Tuberculosis in Patients with Pulmonary Tuberculosis: A Population Based Study, PLOS ONE, 8 (5), 2013.

Minali Raja, Tanvi, Harish Chaturvedi, Aditi Chaturvedi, Prevalence and morphological patterns of tuberculosis in various organs, International Journal of Advances in Medicine, 4 (1), 2017, 117-123.

Olivier Neyrolles and Lluis Quintana-Murci, Sexual Inequality in Tuberculosis, PLoS Medicine Journal, 6 (12), 2009.

Padberg L, Batzing-Feigenbaum J, Sagebiel D, Association of extra-pulmonary tuberculosis with age, sex and season differs depending on the affected organ, The International Journal of Tuberculosis and Lung Disease, 19 (6), 2015, 723–728.

Paul H. Mason, Kathryn Snow, Rowena Asugeni, Peter D. Massey, Kerri Viney, Tuberculosis and gender in the Asia-Pacific region, Australian and New Zealand Journal of Public Health, 41 (3), 2017.

Ramirez-Lapausa M, Menendez-Saldana A, Noguerado-Asensio A, Extrapulmonary tuberculosis: an overview, Rev Esp Sanid Penit, 17, 2015, 3-11.

Republic of Lebanon ministry of public health, National Guidelines for Tuberculosis Prevention, Care and Elimination in LEBANON National TB Programme, 2017.

Ridhaa Mohammed Hasan Al-Saadawi and Abeer Gatea, Knowledge of People about the Tuberculosis Infection in the Health Center in Baghdad, Health Science Journal, 13 (1), 2019, 623.

Riyadh M.A. Al-Saegh, Hayder Salih Abbood, Zaid K.Ahmed, Maha A.A.Al-Mukhtar, An Epidemiological Study of Urinary Tuberculosis in Iraq, Kerbala J. Med., 7 (2), 2014.

Robert W Aldridge, Dominik Zenner, Peter J White, Morris C Muzyamba, Miranda Loutet, Poonam Dhavan, Davide Mosca, Andrew C Hayward, Ibrahim Abubakarm, Prevalence of and risk factors for active tuberculosis in migrants screened before entry to the UK: a population-based cross-sectional study, The Lancet Journals, 16, 2016.

Seung Heon Lee, The Korean Academy of Tuberculosis and Respiratory Diseases, Tuberculosis Infection and Latent Tuberculosis, Tuberc Respir Dis., 79, 2016, 201-206.

Tafreshi SH, BCG vaccine and pulmonary tuberculosis, Vaccine Research, 3 (8), 2016.

WHO, Department of Gender, Women and Health, Journal of Gender and Health, gender and tuberculosis, 2002.

WHO, Global tuberculosis report (2012) Geneva: World Health Organization, 2012.